

Comparing Native and Western Perspectives of Science : A Brief Overview

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Modern Western Science

- Essentially the modern word “science” is derived from the Latin root “scientia” whose literal meaning is “knowledge”. In modern terms it is the process and knowledge gained from the application of the “scientific method.” This method is a low-context set of empirical standards experimental methodology applied to researchable questions about “reality.”
- In modern “reality” the role and socio-cultural influence of “science” is far greater.

“official science”

- The power and influence of modern Western Science in western societies is such that it may be said to be the predominant and “official” ethos.
- It is the officially sanctioned body of knowledge which Western governments and courts acknowledge, support and apply in difference and as supreme to all others.

Universalist Camp

- The Universalist Camp contends that modern Western science is universally true because it is based on empirical standards, logical arguments, and skepticism....that can be verified universally through application of the Western scientific method of experimentation... the implication that it is “culture-free”

The Relativist Camp

- The Relativist Camp contends that every culture has a form of science which has evolved over time based on its perceptions and collective experience with the natural world....its way of living....its world-view... and its particular and culturally contexted explanations of nature....
- Modern Western science is only one of many culturally based models...

Indigenous Science and Culturally-Responsive Education

- The inclusion of the Indigenous Science or knowledge on an equal par with modern Western Science is a relatively new and radical idea in modern Indigenous education.
- For proponents of inclusion of Indigenous Science....all cultures have developed a form of “science” which is important.
- For proponents of Western Science: only Western Science is “true science.”

Indigenous Science and Indigenous Knowledge

- Indigenous Science: A “multi-contextual” system of thought, action and orientation applied by an Indigenous people through which they interpret how Nature works in their “place.”
- Indigenous Knowledge: the “high-context” body of knowledge built up over many generations by a cultural distinct people living in close contact with a “place”, its plants, animals, waters, mountains, deserts etc.

Indigenous Science Knowledge

- Indigenous science knowledge is derived using the same methods as modern Western science including: classifying, inferring, questioning, observation, interpreting, predicting, monitoring, problem solving and adapting.
- One difference is that Indigenous science perceives from a “high context” view including all relational connections in its consideration. Western science perceives from a “low-context” view reducing context to a minimum.

The Philosophical Base of Indigenous Science

- Development of knowledge through
Indigenous science is guided by:
spirituality, ethical relationship, mutualism,
reciprocity, respect, restraint, a focus on
harmony and an acknowledgement of
interdependence.
- This knowledge is integrated with regard
to a particular “place” toward the goal of
long term sustainability.

Epistemological Characteristics of Indigenous Science

- Oral transmission
- Observation over generations
- Cyclic time orientation
- Quantification is at the macro level
- Specific cultural/literary style and symbolism
- Knowledge is contextualized to a specific tribal culture and place
- Conservation of knowledge through time and generations

Protocols of Indigenous Science

- Native Science integrates a spiritual orientation.
- Dynamic Multidimensional harmony is a perpetual state of the Universe.
- All human knowledge is related to the emergence of humans into the world.
- Humanity has an important role in perpetuation and sustainability of natural processes in the world.

Protocols Continued...

- All things of the world are animate and have spirit.
- There is a significance to each place because each place reflects the whole order of Nature.
- The history of a place must be respected with regard to places, animals, plants, and natural phenomena. Each place has a spirit and a story which must be considered and respected.
- Technology used should be appropriate and reflect balanced relationship with the natural world.

Protocols Continued...

- There are basic natural relationships, patterns, cycles AND associated human responsibilities that need to be understood and respected.
- There are stages of initiation to natural knowledge.
- Action in the natural world must be sanctioned through ceremony.
- Properly fashioned artifacts contain the energy of thoughts, materials, and contexts in which they are fashioned and therefore become symbols of those thoughts, entities or processes.

A View of Native Environmental Policy

- Policy evolves from need to sustain the well being of both human and natural communities through time.
- Policy reflects cultural view of a people.
- Policy sustains life of a natural place.
Policy is based on participatory community based research.
- Policy applied with minimal impact on a human and natural community.

Reference

- Native Science: Natural Laws of Interdependence (2000)
- Gregory A. Cajete
- Clear Light Publishers
- 823 Don Diego Street
- Santa Fe, New Mexico
- www.clearlightbooks.com

Evaluating the Health Risks of Toxics in Shellfish from a Swinomish Perspective



Swinomish Tribal Community

P.O. Box 817 • 11430 Moorage Way
LaConner, WA 98257



Swinomish Water Resources Program

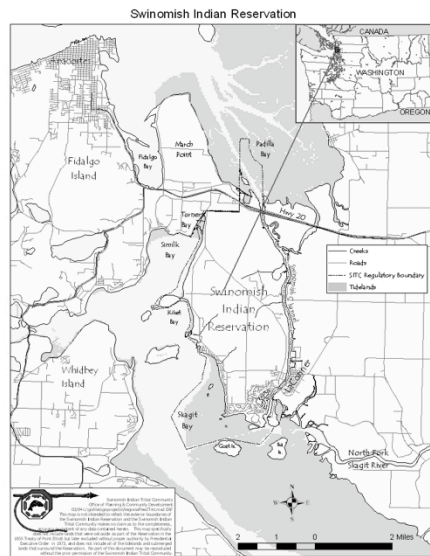
Office of Planning & Community Development

P.O. Box 817; 11430 Moorage Way • LaConner, WA 98257 • 360.456.7280 • 360.456.1615 fax

Dr. Jamie Donatuto, Swinomish Indian Tribal Community

Dr. Barbara Harper, AESE, Inc., and Confederated Tribes of the Umatilla Indian
Reservation

Swinomish context



- Coast Salish fishing people
- Homeland in Northwest United States
- Treaty of 1855: Sovereign nation
- Reservation: ~3,000 acres tidelands + ~7,000 acres uplands
- ~900 enrolled members; half live on Reservation

Chronology of contaminated shellfish

1990's-2000's: Gov't agencies report host of toxic chemicals in local water, sediment and shellfish tissue

Swinomish fishers report contamination

2002: Swinomish initiated human health risk assessment of local shellfish

2006: results released; questioned by Swinomish leaders & community; initiated alternative risk assessment



Bio-accumulative Toxics In Swinomish Shellfish Project

Hypothesis: The Swinomish people are exposed to low level, chronic bioaccumulative toxics when participating in subsistence gathering and consumption of shellfish.

Specific Aims: determine the types and concentrations of chemicals present; perform health risk assessments; enact community envr ed & outreach, and develop mitigation options



Swinomish Sample Collection



Steamer & Butter clams



Dungeness crabs

Target Chemicals: arsenic, copper, cadmium, selenium, mercury, lead, nickel, PCB aroclors & WHO list congeners, PAHs, Dioxins/-furans, Chlorinated pesticides, Butyltins (i.e., TBT)

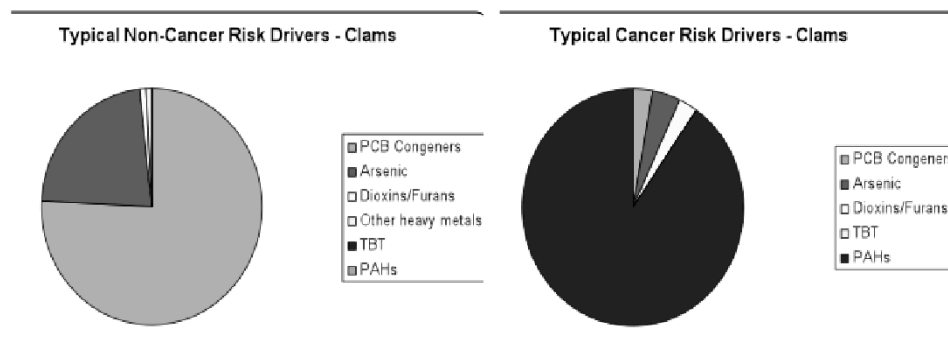
Risk Assessment—consumption rates

<u>Amount Eaten</u>	<u>Rationale</u>
17.5 gpd	EPA Office of Water Quality proposed national rate
48.5 gpd	EPA & FDA recommend two 6-ounce meals/ wk
63.2 gpd	CRITFC mean for fish consumers; about 1 lb/ wk
72.9 gpd	Tulalip & Squaxin Island mean fish consumption
214 gpd	Suquamish mean fish consumption
389 gpd	CRITFC 99th percentile minus 4 “outliers”
540 gpd	Harris & Harper rate for current Umatilla subsistence
620 gpd	Boldt Decision cited 500 lbs per capita on Columbia River
650 gpd	Walker mid-range of top 10% Yakama members on Columbia River during the 1950s and 1960s
1000 gpd	Walker est. of pre-dam rates for Columbia Plateau tribes

22

Risk Assessment: Clams

% each toxic contributed to total amount found

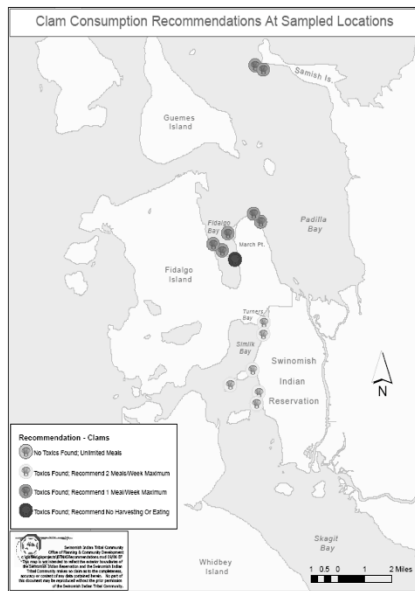


Biggest cancer risk drivers: arsenic

Biggest non-cancer risk drivers: PCB congeners, then arsenic

Pie charts show proportion each toxic group contributes to risk found

Consumption Recommendation: Clams

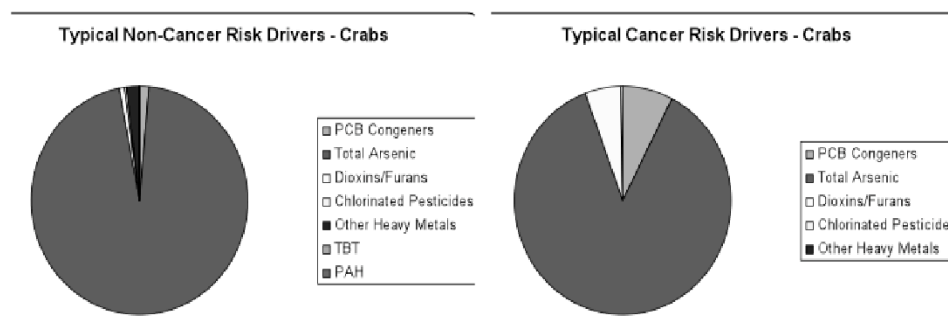


Key:

- There are no green sites (unlimited) anywhere.
- Orange means less preferable or one meal per week (alone or in combination)—7 sites
- Yellow means two meals per week—7 sites
- Red means no meals-1 site

Risk Assessment: Crabs

% each toxic contributed to total amount found

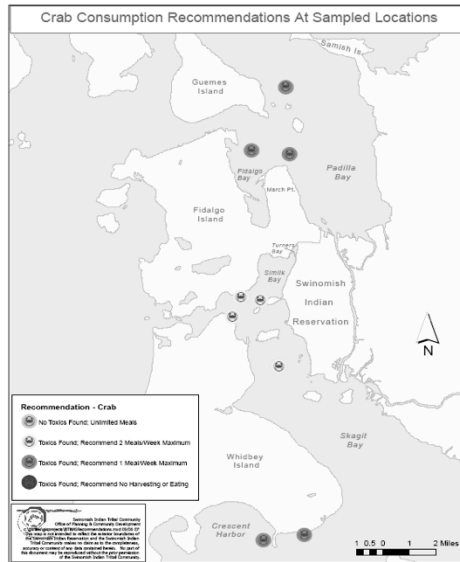


Biggest cancer risk drivers: arsenic, PCB congeners, dioxins

Biggest non-cancer risk drivers: arsenic

*Pie charts show proportion each toxic group
contributes to risk found*

Consumption Recommendation: Crabs



Key:

- There are no green sites (unlimited) anywhere.
- Orange means less preferable or one meal per week (alone or in combination)—5 sites
- Yellow means two meals per week—4 sites
- Red means no meals-no sites

Community Outreach & Education



- Community gatherings
- Youth programs
- Kee-yoks newsletter
- SWN96 cable station
- Native Lens
- Primary care providers—
workshop and materials to hand
out

Swinomish Native Lens



www.longhousemedia.org

Mitigation Options



What about the “other” risk factors?



Source: EPA Office of Research and Development.

How much fish do you eat? Critiques of conventional fish consumption surveys

Although efforts have been made to determine tribal-specific fish consumption rates, conventional methods & analysis may produce inaccurate results due to:

- Random sampling techniques of households
- Written or yes/no style questionnaires
- Analytical methods may recode or eliminate outliers

What is the purpose for collecting the data?

- Rates found “suppressed” below “heritage” rates; “heritage” rates are harvest and consumption rates tribes retained with treaties

1st interviews on consumption/use: Seafood Diet Interviews

New approach to gathering fish consumption data:

- Over-sample suspected high consumers: elders, fishers, those living traditional lifestyle
- Oral interviews with open-ended question themes
- Question themes on past & current harvest & consumption, reasons for changes over times, and impacts from contamination

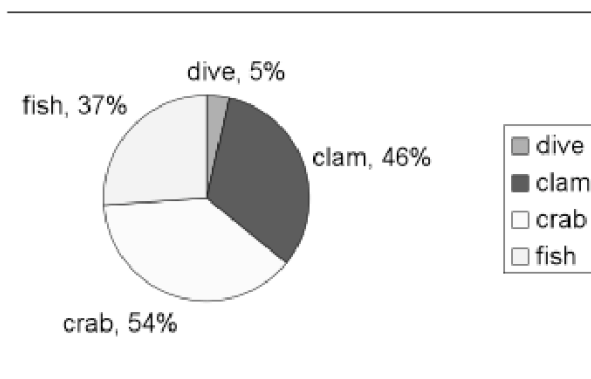
	Age groups		
	16-37	38-54	55+
Interview # (76 total)	47	18	11
Female	25 (53%)	6 (33%)	5 (45%)
Male	22 (47%)	12 (67%)	6 (55%)

Seafood diet interview results: Snapshot of current conditions

- Top five seafood types eaten:
- people harvesting seafood (n=76):

1. salmon (all 5 species)
2. crab
3. shrimp
4. tuna (a commodity food staple)
5. clams

Everyone interviewed eats seafood.



Seafood diet interview results:

Changes over time

- 84% said that more seafood was available and harvested in the past compared to today (n=55)
- 76% said that they ate more seafood as a child compared to today (n=62)
 - 90% elders (55+); 73% (38-54 years old); 75% (16-37 years old)
- 73% said that they would like to eat more seafood than they do now (n=74)

Seafood diet interview results:

Changes over time

Reasons for eating less seafood (in descending order):

- Less access—e.g., less harvesting locations, more regulations, not as much sharing
- Cash economy—fishers forced to sell more catch
- Food preference—children not taught
- Lower availability—stock health
- Health constraints—ability to harvest
- Pollution—concerns of effects
- Cost—too expensive to buy in store

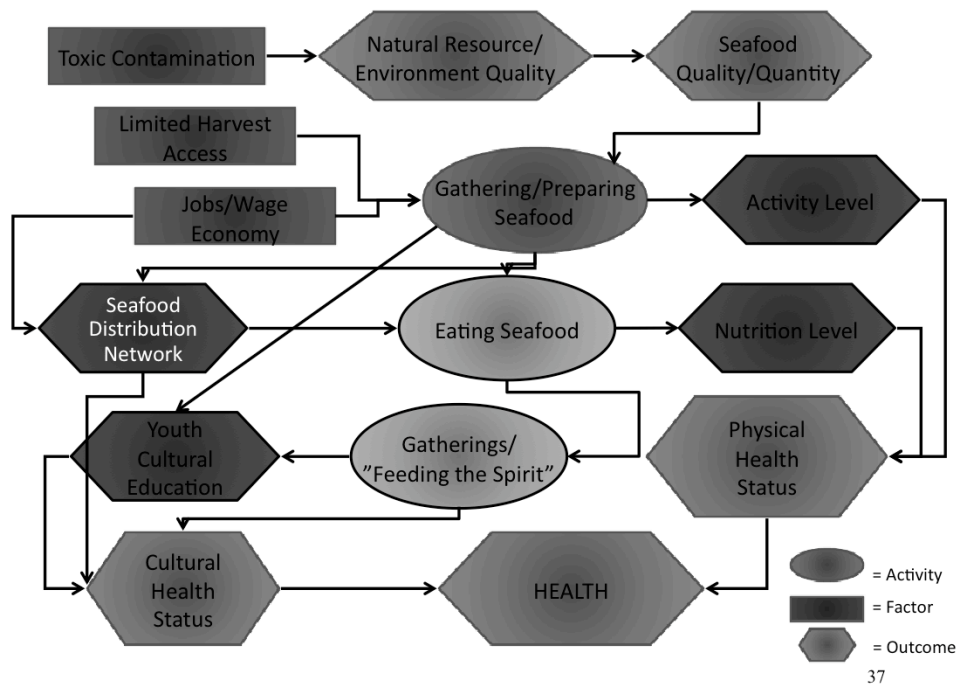
Seafood diet interview results: Impacts of contamination

- 63% think about or hear about pollution in the local waters (n=76)
- 61% said that they worry whether or not it's safe to eat seafood (n=67)

*Yet pollution doesn't stop people
from eating seafood...why?*

- 84% stated that gatherings would change or be impossible without seafood (n=76)

*Many people mentioned a "hunger" for
seafood that transcends a physiological
longing, and that seafood "feeds the spirit."*



Defining health

“A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (WHO 1946).

“Health is a resource for life, not the object of living” (WHO Ottawa Charter for Health Promotion 1986).

Many Native communities view health as multi-dimensional and reflective of their values, beliefs and practices; this includes physical, cultural, social, mental and spiritual indicators that are inter-related on a community level and cannot be assessed separately (e.g., Arquette et al. 2002, Harris and Harper 1997, 2000, 2001, Wolfley 1998).

Toward evaluation of health risks: Key concepts

- Shellfish are “cultural keystone” species -- vital objects in physical, cultural, spiritual, and social life (Garibaldi & Turner, 2004)
- Risks may be physically manifest and known hazards, yet they can never be understood nor assessed outside of the social and cultural constructs of those experiencing them (Douglas 1992, Lupton 1999, Nelkin 2003)
- Any risk assessment that fails to address the issues deemed most important by the affected group will not be effective in determining risk (National Research Council, 1996)

2nd interviews: Defining & prioritizing health in relation to seafood

Expert and elders interviews



Purpose: Swinomish definition of health, health priorities & impacts in relation to contaminated seafood

	Age groups		
	16-37	38-54	55+
Interview #	1	1	12
Female	0	0	4
Male	1	1	8

2nd interviews: Defining & prioritizing health in relation to seafood Expert and elders interviews

- Sample question themes:
 - General health, e.g., “What does being healthy as an individual and a community mean to you?”
 - Historical health, e.g., “How do you think the health of the Swinomish community today compares to when you were a child?”
 - Connection between food & health, e.g., “Are there differences between seafood bought from the store and what comes from Swinomish fishers?”
 - Seafood contamination, e.g., “Does contamination change the way shellfish are used?”

Defining and assessing health in relation to contaminated shellfish

Important health indicators:

Community cohesion

- Participation & cooperation
- Roles
- Familiarity

Ceremonial use

- Gatherings and ceremonies
- Give thanks
- Feed the spirit

Food security

- Availability
- Access
- Sharing

Education

- The Teachings
- Elders
- Youth

Defining and assessing health in relation to contaminated shellfish: How do contaminated shellfish impact Swinomish health?

Using a descriptive scale ranking approach:

A lot

Somewhat

A little

Not at all

N/A

What is the current status of health? Do contaminated shellfish impact health; if so, how?

Community Cohesion:

- Participation & cooperation – **Not at all**

“[It’s not about contamination.] We are more concerned about our own immediate family and not our part of the community...”

- Roles -- **Not at all**

“[No.] We still have our fisherman. We still have our clam diggers.”

- Familiarity – **A lot**

“...[if] it’s purchased, it doesn’t come from anywhere we’re familiar with... I don’t know where those clams came from in that store.”

□

What is the current status of health? Do contaminated shellfish impact health; if so, how?

Food Security:

- Availability– **A lot**

“...you dig, you get a lot of oil filled shells and sand in your clam shells and you don’t have no more clams left... It [pollution] depletes our clam beds.”

- Access -- **A lot**

“...that was all tidelands that we should be able to go and dig on any time we want. You get out to other places that we’re supposed to dig too and they’ve got signs all over the place.”

- Sharing – **Somewhat**

“I’ve had an elder tell me that she was really wishing for sea eggs [urchins] and she didn’t know how to get them. There are things that are missing such as that.”

□

What is the current status of health? Do contaminated shellfish impact health; if so, how?

Ceremonial Use:

- Gatherings & ceremonies – **A lot**

“If there wasn’t seafood to be eaten, we really couldn’t have that ceremony [blessing of the fleet]. We’re not going to celebrate going crabbing with a slice of steak or piece of pork.”

- Give thanks – **A little**

“You talk about your processed food... it’s like we lack the prayers for gathering this food.”

- “Feed the Spirit” – **A lot**

“..they lose the power and the success and the spirit of the ceremonies and of the gatherings without the traditional foods, because it’s all central. It’s like when people come... and you feed their spirit with the stuff... Their soul... the spirit is hungry for that...”

What is the current status of health? Do contaminated shellfish impact health; if so, how?

Education:

- The Teachings– **A lot**

“Yes, I think its accessibility and I think that there has been a loss in that consistency from generation to generation that it hasn’t been passed from one generation to the next.”

- Elders– **Not at all**

“[No.]. The government imprisoned our elders for teaching the old ways... and so people became afraid of the traditional way[s] of life and would stay from them...”

- Youth – **Somewhat**

“A lot of our youth don’t know some of the things... like octopus, sea eggs, or sea urchins... they have no clue as to what it is or even how to eat it.”

**Defining and assessing health in
relation to contaminated shellfish:** How
do contaminated shellfish impact Swinomish
health?

Community cohesion: $(1 + 1 + 4) / 3 = 2$

A LITTLE

Food Security: $(4 + 4 + 3) / 3 = 3.7$ or 4

A LOT

Ceremonial Use: $(4 + 2 + 4) / 3 = 3.3$ or 3

SOMEWHAT

Education: $(4 + 1 + 3) / 3 = 2.7$ or 3

SOMEWHAT

A lot	4
Somewhat	3
A little	2
Not at all	1
N/A	0

Recommendations

Creating an evaluation tool to be employed *in parallel* with the conventional risk assessment framework

“Empirical knowledge is culturally contingent, its meaning deriving from its embeddedness in non-empirical understandings of the world... Empirical knowledge simply cannot be removed from its broader social context without distorting or destroying it” (Nadasdy, 2003: 112)

Recommendations



- Re-evaluate assumptions regarding equal measures between each descriptive health ranking & between health indicators/ components
- Determine how to compare risks & impacts across the prioritized health indicators/ components—averaging?
- Recognition of uncertainty in traditional knowledge
- Continued evaluation, testing, and refining tool

Recommendations: Risk management & policy implications

- Each tribe unique
- Decision on where action threshold is set dependent on govt-to-govt consultations required as part of federal trust responsibilities
 - Actions taken, i.e., mitigation, clean up
 - Levels of action
 - Risk reduction vs risk avoidance
- Possible promulgation into policy

U.S. gov't has Treaty and trust responsibility to protect the health and welfare of Native Americans; the government must adhere to these Treaties-- "highest law of the land."

Seafood, health and Swinomish



*“Like we say, it’s
our spiritual food
so it feeds our
soul; so it might
poison our body,
but then we’d
rather nourish our
soul.”*

▣

Thank you.



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